The Allaire Business Platform

2000 Technology Roadmap

An Allaire White Paper

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Allaire Corporation • One Alewife Center • Cambridge • MA • 02140
www.allaire.com • info@allaire.com • (617) 761-2000

EXECUTIVE SUMMARY

Abstract

For development managers and senior IT/MIS managers, this white paper describes the software infrastructure required to deliver Internet business systems. Based on the model established in Section II, the paper provides an overview of the Allaire Business Platform today and a roadmap for new Allaire products and technologies in the future. The final section discusses strategies for building your business on the Web using Allaire products and technologies.

Overview of Key Sections

- **Opportunity in the Internet Economy –** The technology innovation and adoption represented by the Web, email, and other Internet technologies is creating significant new opportunities for businesses in four key disciplines: online commerce, customer relations, content management, and business automation. The software systems put in place to realize these opportunities will lay the groundwork for your company's success or failure in the Internet Economy

- **Building for the Internet Economy –** Taking advantage of the opportunities created by the Internet Economy requires a new investment in e-business software infrastructure. This infrastructure has three basic pillars: application servers, packaged applications, and visual tools. This section describes the services that should be provided by this new category of products.

- **The Allaire Business Platform –** Allaire provides an integrated suite of software products for building your business on the Web. This section describes those products and how they address your e-business software infrastructure requirements. This section also provides product roadmaps for Allaire's application servers, packaged applications, and visual tools.

- **New Initiatives –** As new business models begin to take root and e-business applications become increasingly mission critical, new services will be required from your e-business software infrastructure. This section describes the roadmap for some of Allaire's new product initiatives.

- **Delivering Solutions –** Returning to the four Internet business disciplines introduced in the first section, the final section describes how you can use the Allaire Business Platform to create solutions in each of the disciplines.

Conclusion

To stay successful in the Internet Economy, companies need to create new business solutions today, and set the stage for growth and innovation in the future. The Allaire Business Platform makes these new solutions possible—giving you the foundation to achieve success on your own terms.

SECTION I: INTRODUCTION

Opportunity in the Internet Economy

From the invention of the printing press to the steam engine to air travel, technology innovation has been the motive force behind structural change in the economy. Today, Internet technologies are reshaping the way you conduct commerce, work with partners, serve customers, and organize your business. From email to the Web to wireless networks, a new wave of technology innovation and adoption has ushered in the Internet Economy.

The business opportunities created by the Internet Economy are driving an imperative for change within companies worldwide. To compete, firms in every industry are innovating in four major Internet business disciplines:

- **Online Commerce** - *Business is being conducted on the Net***.** Whether it's two companies buying services and products from each other or an individual buying from their favorite brand, commerce is moving to the digital network. Through the Internet, fundamental business relationships are being extended and automated, distribution chains re-intermediated, and whole new business models launched.

- **Customer Relations** - *Everyone is in a digital community***.** Your customers and partners can communicate every day with you and, more importantly, with each other. They form communities where information flows more freely, expectations are higher, and commitments are more fickle. Your ability to engage and nurture these new communities will define success against basic objectives, such as customer satisfaction and brand loyalty.

- **Content Management** - *Information actually is power*. From content publishing on your site to knowledge management on your intranet, your company's ability to marshal and distribute information among employees, partners, and customers will determine how well it will respond to market demands.

- **Business Automation –** *Your productivity is a function of your business systems.* The incredible efficiency that results from browser-based deployment makes Web applications a cost-effective way to automate almost every business process. From project management to sales force support, your ability to leverage Internet technologies to streamline and accelerate business processes will have a direct impact on your ability to compete at the pace demanded by the Internet Economy.

The examination of these four major Internet business disciplines leads to an important conclusion about IT organizations and systems: *Your e-business software infrastructure will establish the limits for your company's growth and the terms of its success in the Internet Economy.* Ideally, you want that growth to be unlimited, and you want success to be defined on your own terms. So the most important IT challenge today is to choose the e-business software infrastructure and build the Internet business systems that will enable your company's success in the new economy.

The following white paper addresses the challenge. The next section, Section II, describes a model for your e-business software infrastructure. The model provides a basis to understand the technology required for

delivering solutions in the Internet economy. Using the model established in Section II, Section III describes the Allaire Business Platform and how it can address your e-business software infrastructure needs today and in the future. Section IV lays out a roadmap for new initiatives and technologies in the next generation of the Allaire Business Platform. Finally, Section V describes how you can apply the technology to address each of the four major Internet business disciplines.

SECTION II: BUILDING FOR THE INTERNET ECONOMY

A Foundation for Success

Through our work with thousands of customers, Allaire has developed a model of the software infrastructure required for successfully delivering business systems in the Internet Economy. The model describes the services that should be provided by a layer of e-business software infrastructure technology, which leverages your existing IT investments in hardware, network operating systems, and back office systems. The new software infrastructure becomes the foundation of the Internet business solutions you build to interact with employees, partners, and customers.

The first step to understanding the requirements of your e-business software infrastructure is to put it in the context of the other major components of your IT infrastructure. For the purposes of this discussion, IT infrastructure can be understood as five basic layers:

- **Hardware** – In an economic system based on digital networks, the physical infrastructure of servers, workstations, devices, routers, and wires provides the basic foundation for everything else.
- **Network Operating Systems** – On top of the physical infrastructure, operating systems and network services make communication and development possible.
- **Back Office Business Systems** – Most companies already have an installed base of back office business systems, including databases, messaging servers, directory servers, enterprise applications, and potentially a wide array of other legacy systems. Put in place to run the business, this infrastructure needs to be leveraged in the Internet Economy.
- **E-Business Software Infrastructure** – This is the new layer of server technology required to deploy business systems that take advantage of the new technologies available on the Internet. This paper describes this layer in detail.
- **End-User Clients** – On the Internet, there are a wide variety of end-user clients and devices—from custom Java clients to wireless devices to browsers. Among these, the browser is the most pervasive, and it has become the universal client for the vast majority of new applications.

Of these five layers, the e-business software infrastructure generates the most confusion, yet yields the highest impact when understood and implemented successfully. This new generation of information technology is in the process of being defined by vendors creating a wide variety of new products. Based on our experience working with pioneers in the market, Allaire has developed a baseline model for the services that should be provided by your e-business software infrastructure.

E-Business Software Infrastructure

Typically, e-business software infrastructure is not available as a single monolithic product. Instead, it is sold as a suite of integrated products and technologies. Because every vendor offers a different configuration, the best way to understand this layer of technology is to break it down into sets of services.

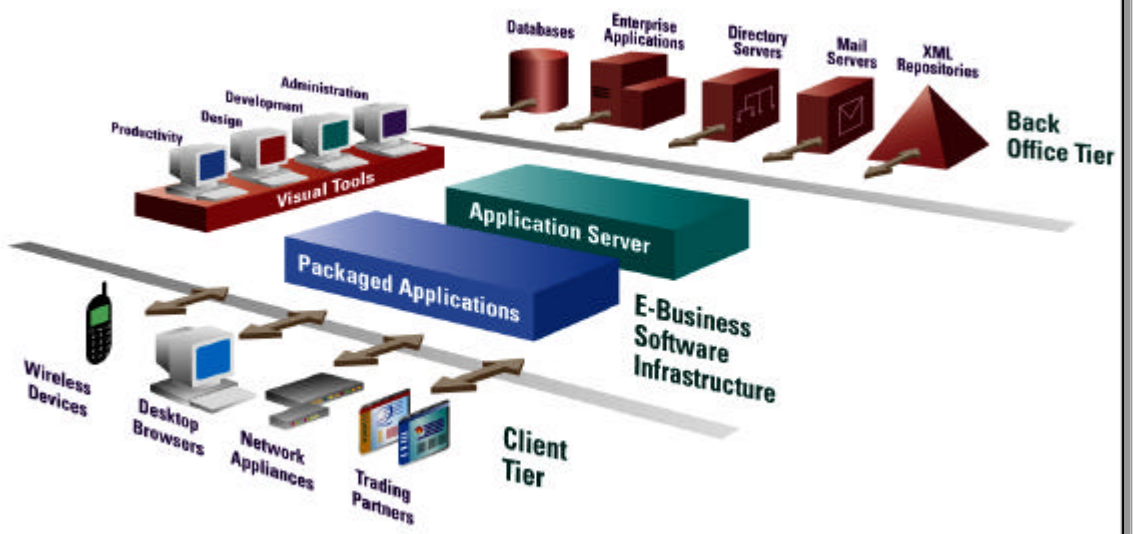

Fig. 1 – Model Architecture for Internet Business Systems

There are three core elements at the center of any e-business software infrastructure:

- **Application Servers** – Fundamentally, application servers provide the runtime environment for application logic and the foundation of your e-business—the operating platform for your Web applications. Application servers abstract common problems, such as security and state management, into services that developers can easily use in their applications. As a result, application servers let you build and deploy reliable Internet applications quickly. Your e-business software infrastructure begins with application servers.

- **Packaged Applications** – Packaged applications are designed to accelerate time to market with pre-built components and advanced services for everything from content management to personalization to e-commerce. Your e-business software infrastructure should include a suite of packaged applications deployed on your application server technology. These applications should be customizable to meet the needs of your unique business requirements.

- **Visual Tools** – Internet business system development requires three basic classes of visual tools: (a) integrated development environments (IDEs) for developers, (b) a common administrative console for systems administrators, and (c) productivity tools for business users. Any successful software infrastructure will need to include these tools or integrate with best-of-breed tools in these categories.

All three components of your e-business software infrastructure should work together to support building your business on the Web. Choosing the right infrastructure technology will ensure you can build new business solutions, leverage investments in back office systems, and adapt as technology advances and business requirements change. The following sections describe in-depth each of the three components of an ideal e-business software infrastructure.

Application Servers

As the runtime environment for applications, the application server technology in your e-business software infrastructure is the cornerstone for everything you build. Given the requirements of Internet applications, the application servers should provide a two-layer programming model, a set of core services, and a set of integration services.

Two-Layer Language Model

The most flexible programming model for e-business applications has two layers: a Web application logic layer and a business logic layer. The Web application layer provides runtime services for basic application logic as well as dynamic page and user interface generation. The business logic layer supports distributed components that implement complex business rules and integrate with back office systems. Both layers should have full access to the core services and the integration services (described below).

Fig. 2 – Application Server Services

There are several advantages to this approach. The two-layer model lets developers choose the most appropriate programming model for each component of an application. This increases the productivity and flexibility of the developers. The two-layer model also lets you tier the development organization, taking advantage of a broader range of development skills and competencies. Finally, the two-layer model is highly modular, which makes application maintenance significantly easier and lowers total cost of ownership over the lifetime of the systems.

Web Application Layer

The Web application layer should provide a page-based programming environment that is cleanly integrated with HTML. With browsers as the universal client across desktop operating systems and devices, it is critical to be able to easily generate dynamic pages, manage application logic, and connect to backend systems from these pages. It's not unusual for some classes of applications to be entirely written in the Web application layer.

Business Logic Layer

The business logic layer needs to provide an environment for building and deploying distributed business components typically using a distributed object standard such as COM, CORBA, or EJB. The programming language in this layer should be object oriented, and the environment should support distributed objects . This layer is used for implementing advanced business logic and business rules. For example, you might program the rules for qualifying a loan application in a banking program in this layer. Also, objects in the

business logic layer may be created to represent business entities, such as customers, and complex business processes, such as order management.

Core services

Both the Web application layer and the business logic layer need access to a set of core services that are used throughout an application. One of the most important benefits of using an application server is that it eliminates the need for custom implementations of these services—increasing productivity and lowering maintenance costs for business systems. The core services in your application servers should include the following:

- **Security –** Security services let you easily create security regimes on several levels throughout your business systems. These services often include authenticating users, controlling access, securing components, and integrating with existing security systems.
- **State Management –** The Web is a stateless environment, so your application server should provide robust mechanisms for tracking users across pages. State management should operate on a variety of levels and offer a number of different secure mechanisms for identifying users.
- **Transactions –** Transactions ensure that a single unit of work is accomplished successfully without loss of data or data integrity. With transaction services, you can build two-phase commit across multiple databases and roll back a series of application actions if one step in a process fails.
- **Message Queuing –** Message queuing enables reliable asynchronous application interactions. For example, if one component in an application needs to call another, using a message queue can ensure that communication is completed successfully—even if the receiving component is not currently available.
- **Text Indexing and Searching –** Web applications tend to incorporate a significant amount of text-based content. Text indexing and searching services let you query the unstructured textual data in your applications quickly and easily.
- **Clustering –** Clustering services, such as server failover, HTTP request load balancing, and component load balancing, increase the scalability and reliability of your business systems.
- **Logging –**Monitoring and tracking server actions, errors, application behavior, and user behavior within applications requires a robust set of logging services. This information is critical to trouble shooting problems and optimizing server configurations.
- **Administration –** Every application and component deployed in a server environment requires management and administration. Administrative services allow you to manage and configure settings across servers and applications easily.

Integration services

Another key value provided by your application servers is pre-built connectivity to industry-standard protocols and existing enterprise software infrastructure. With the correct architecture, the application server's integration services will ensure reliability and performance when connecting to back office business systems. The integration services in your application servers should include the following:

- **Databases –** Support for ODBC, JDBC, and native database drivers as well as advanced features, such as connection caching, enable you to put scalable database integration at the center of your Internet business systems easily.

- **Directories –** Connectivity to standard directory services through the Lightweight Directory Access Protocol (LDAP) and the Java Naming and Directory Interface (JNDI) let you access key corporate information, such as user names.

- **Mail Servers –** Through the Simple Mail Transfer Protocol (SMTP) and the Post Office Protocol (POP), application servers enable email integration with your applications for everything from notification to customer interaction management.

- **Enterprise Applications –** Native support for connecting to enterprise resource planning (ERP) systems, such as SAP and PeopleSoft, let you leverage this installed infrastructure in the Internet Economy.

- **File Servers –** Using the File Transfer Protocol (FTP) and native file protocols, file server connectivity features are used for applications, such as content management, document management, and other file-based operations.

- **HTTP Servers –** Through server-side HTTP, you can create business-to-business commerce networks, and Internet-based agents for information collection, exchange, and integration.

Packaged Applications

Packaged applications are the second major element of your e-business software infrastructure. In the client/server computing paradigm, most companies found ways to automate their core business process with ERP packaged applications for finance, human resources, sales force automation, and manufacturing. By starting with packaged applications from an ERP vendor, companies were able to accelerate the process of delivering the new business systems, and take advantage of best practices modeled in the applications.

In the Internet Economy, there are a new set of business processes and problems that are being automated—from online sales to customer self-service. To tackle these challenges with new Internet business systems, many companies are turning to a new generation of packaged applications specifically focused on e-business. These packaged applications should be a part of your e-business software infrastructure, and ideally they should be closely integrated with the other components of your infrastructure.

Your packaged applications should provide a set of core application services in a flexible framework that solves the basic requirements of Internet business systems. Because these systems almost always combine information, transactions, and interactivity, your packaged applications need to provide services for everything from content management to personalization.

On top of the core services, most packaged applications offer vertical or horizontal modules for specialized problems. Common vertical modules include specialized implementations for industries ranging from

financial services to manufacturing. However, because most Internet Economy business challenges are common across industries, many packaged application vendors are focusing on common horizontal areas:

- **Marketing** – With services such as user profiling, usage tracking, and digital campaign management, marketing modules accelerate the time to market for development of Web-based marketing programs.
- **Sales** – On top of the services of an online store, there are a wide range of tools that a direct sales team can use to manage client interactions, distribute information, schedule customer visits, and generally automate the process of qualifying prospects, educating potential customers, generating quotes, and closing sales.
- **Service** – Thousands of firms have already found that automating service with Web-based customer self-service systems provides an incredibly high return through both cost savings and increased customer satisfaction.
- **Merchandizing** – Core online store services, such as catalogs and shopping carts, are the beginning of much more complex automated selling systems with support for functionality, including dynamic pricing, promotions management, and automated sales agents.

By encapsulating best practices, while at the same time allowing custom solutions to your business needs, the most appropriate packaged applications will significantly enhance your ability to deliver Internet business systems. Without the head start that these applications provide, meeting the time-to-market requirements for new business solutions is extremely difficult.

Visual Tools

Visual tools are the final major component of your e-business software infrastructure. When your business is manifest as a set of applications, the platform you choose to build those systems should provide tools for every person involved with the business. System architects and server administrators need administration tools. Application developers and designers need integrated development environments. In addition, business managers, business users, and content providers need to be empowered with control over their content and business functions.

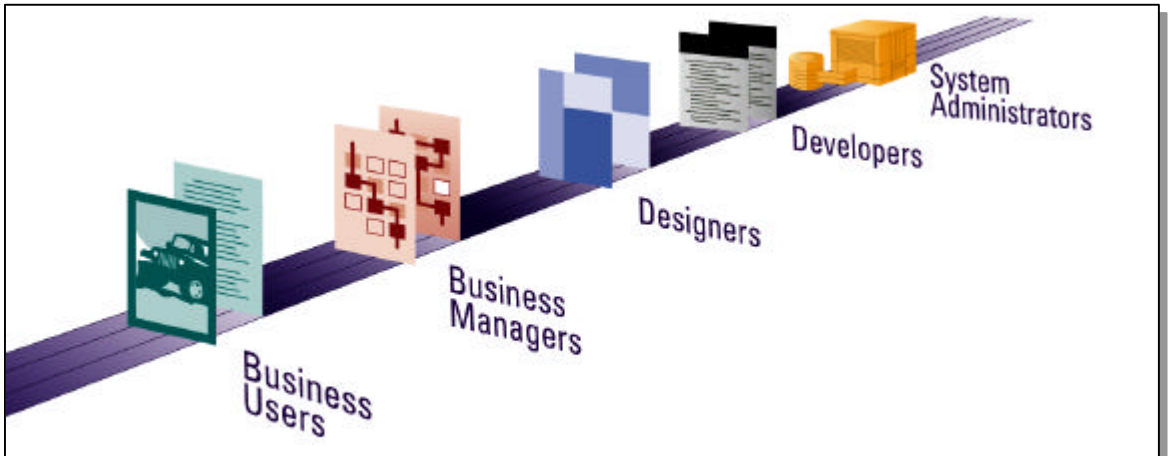

Fig. 3 – Spectrum of Participants

Your e-business software infrastructure should provide visual tools for everyone on the spectrum of participants.

Administrative Tools

The administrative tools need to give server administrators and developers the ability to configure servers, manage distributed business objects, deploy applications, monitor performance, and gather operational data. Because large-scale e-business solutions are typically deployed on multiple servers, the administrative tools should let you consolidate the administration of the different servers in your environment into a single console.

Development Tools

For system programmers, application developers, and designers, your e-business software infrastructure needs to offer an integrated development environment (IDE). Because of the multi-language environment of the Internet, the IDE should support HTML, WML, and XML scripting, page-based application development, and Java business logic and distributed object programming. As an enterprise IDE, it should also support debugging, team development, database tools, remote development, project management, and other advanced programming features to increase developer productivity and ensure application quality. Companies tend to choose a variety of IDEs that work together to meet all of their needs.

Business Productivity Tools

In the traditional enterprise application development world, there was a clear distinction between “end users” and “developers.” In Internet business systems, the end users are often customers or partners, and the applications themselves include rich content and business process automation. So your e-business software infrastructure needs to include business productivity tools for the business managers, business users, and content providers that use applications to interface with each other and with your customers.

The business productivity tools may include content authoring, content publishing, online store administration, Web marketing, workflow management, and a wide range of other business automation functions. With the right tools, your business users are empowered to make business decisions quickly and implement them instantly. Freed from non-technical tasks, IT users can then focus on building new functionality and managing the system. Your e-business software infrastructure should provide a complete suite of extensible business productivity tools. Often, these are a part of the packaged applications you choose to deploy.

SECTION III: THE ALLAIRE BUSINESS PLATFORM

Overview

The Allaire Business Platform is an integrated suite of products that provide the software infrastructure for building online businesses. Based on proven, award-winning technology, the platform is a highly productive, open environment for creating solutions that enable business to take advantage of the opportunities created by the Internet Economy.

Thousands of companies have already begun building their businesses on the Web using technology in the Allaire platform. The following section describes that platform and its capabilities in detail.

Architecture Overview

The Allaire Business Platform is built on three major pillars consistent with the requirements described in Section II: application servers, packaged applications, and visual tools. Products in each of these areas provide the services required for building business solutions in each of the major Internet business disciplines.

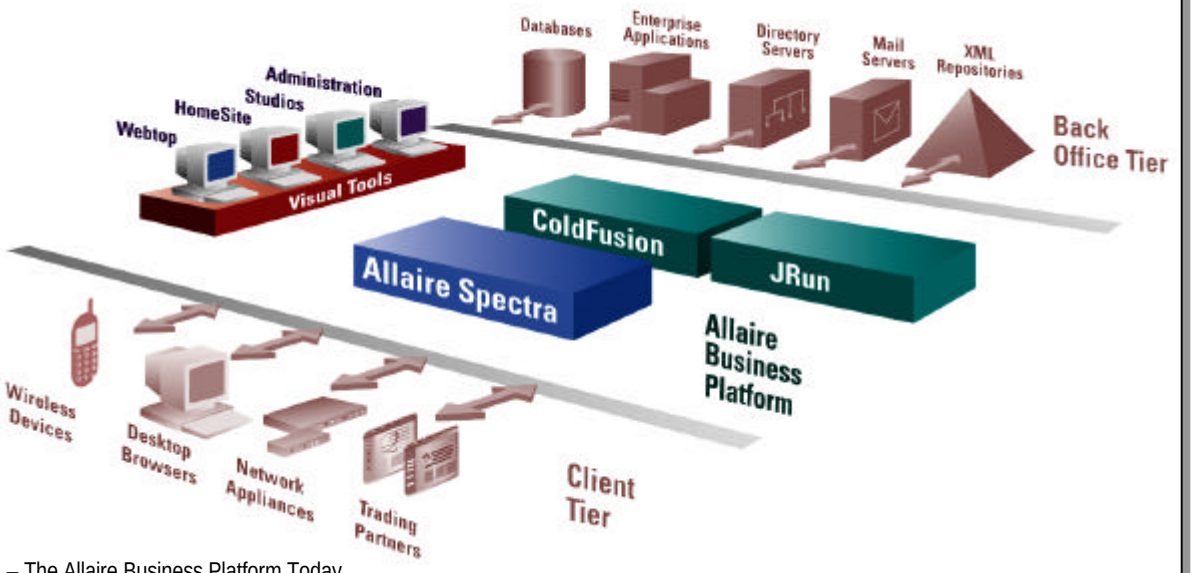

Fig. 4 – The Allaire Business Platform Today

Allaire's Web application server, ColdFusion®, and Java application server, JRun™, are the foundations of the platform. Building on these application servers, Allaire offers a line of powerful packaged applications, Allaire Spectra™, for content management, customer relationship management, and online commerce. Finally, the Allaire Business Platform includes a variety of highly productive visual tools.

Application Servers

The first pillar of the Allaire Business Platform is Allaire's application server technology. Allaire began defining the application server market in 1995 with the release of the first Web application server for Microsoft Windows, ColdFusion 1.0. Since then, ColdFusion has become the de-facto standard for building Web applications across the major operating systems. With more than 150,000 developers and 60,000 servers in the market, ColdFusion is the basis of thousands of successful online business applications.

In the spring of 2000, Allaire entered the Java application server with JRun 3.0, a 100% Java, clean-room implementation of Sun Microsystems' Java 2, Enterprise Edition (J2EE) platform specification. JRun 3.0 provides support for the latest Java 2 specifications for JavaServer Pages, Java Servlets, Enterprise JavaBeans, the Java Transaction API, and Java Messaging Services. It is one of the most complete independent implementations of the J2EE specification.

ColdFusion and JRun can work separately or together depending on your requirements. They serve as the foundation of the Allaire Business Platform today.

ColdFusion 4.5

ColdFusion 4.5 delivers a highly productive, award-winning programming environment and core services for building, deploying, and managing Web applications. ColdFusion already powers many of the most successful dot-coms and literally tens of thousands of applications in major companies across industries worldwide.

ColdFusion provides a Web application programming environment through the ColdFusion Markup Language (CFML), a tag-based server scripting language. Because of its tag-based syntax, CFML cleanly integrates with HTML and XML, making it easy to learn and highly productive. With more than 70 tags, over 300 functions, and open extensibility, CFML is also the most powerful scripting environment available for programming Web applications. At the business logic layer, CFML has very clean integration with distributed object standards, including COM, CORBA, and EJB, so it easily connects with a business logic layer.

In addition to a powerful language environment, ColdFusion provides a strong set of core services and integration services.

Core Services

- Security
- State Management
- Clustering
- Indexing and Searching

- Logging and Administration

Integration Services

- Connectivity to mail, file, database, directory, and HTTP servers
- Integration with ERP systems
- Connectivity to EJB, COM, and CORBA objects

Productivity, scalability, and connectivity have made ColdFusion one of the most successful Web application servers available today. With the introduction of JRun 3.0, Allaire's application server product line is expanding with a pure Java application server that complements ColdFusion and provides powerful functionality in its own right.

JRun 3.0

JRun 3.0 realizes the promise of server-side Java development for enterprise applications. With full support for the J2EE specification, JRun 3.0 is the most productive way to build and deliver e-business applications with Java. 3

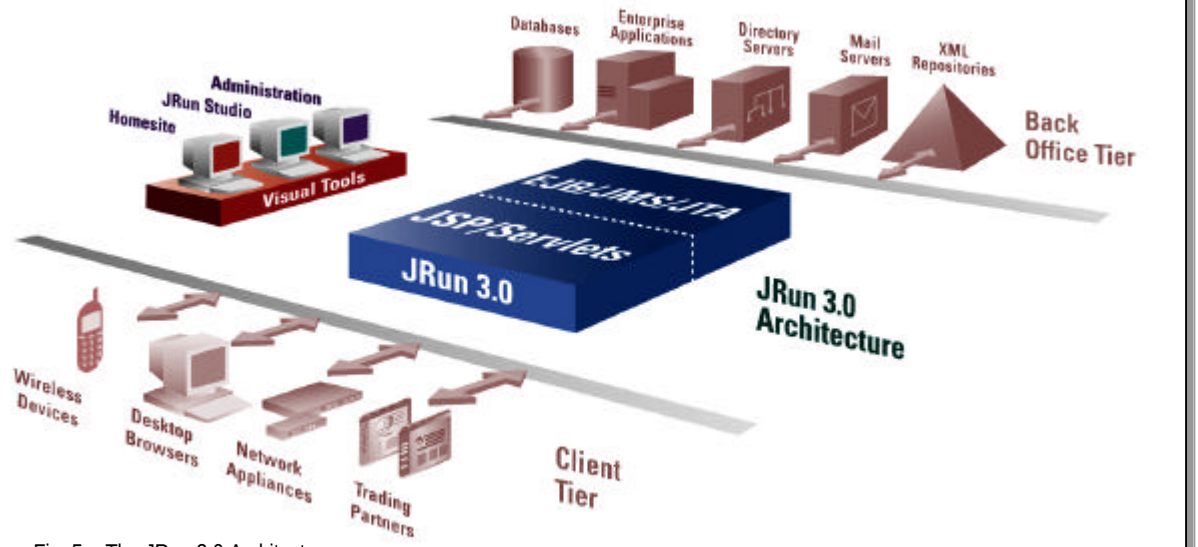

Fig. 5 – The JRun 3.0 Architecture

The J2EE specification includes a Web application language layer, JavaServer Pages (JSP), and a business logic layer, Enterprise JavaBeans (EJB). JSP is the model for page-based scripting with Java or JavaScript. EJB is a distributed object standard that provides a flexible and highly scalable means for building and deploying business components.

Core Services

JRun 3.0 includes all of the required and optional services specified for the J2EE platform as well as a number of other value-added services. These include the following:

- Security
- Dynamic Pages – JavaServer Pages (JSP 1.1), and the Java Servlet API 2.2
- Distributed Objects – Enterprise JavaBeans (EJB 1.1)
- Messaging – Java Messaging Services (JMS 1.0)
- Transactions – Java Transaction API (JTA 1.0)
- HTTP Request Load Balancing
- Server Failover
- Administration and Real-Time EJB Monitoring

Integration Services

Through Java, JRun 3.0 offers connectivity to your entire enterprise. JRun 3.0 supports all the standard Java connectivity libraries. In addition, it includes a number of special connectivity features:

- Directories – Java Naming and Directory Interface (JNDI)
- Databases – Java Database Connectivity (JDBC), and Native Database Drivers
- Email – Java Mail API

JRun can be used alone as a full Java application server or with ColdFusion to provide the backend business logic layer through EJB. Deployed on its own, JRun is a complete Java application server. You can use it to build basic Web applications with Java or create complex, highly scalable distributed enterprise applications. In addition to applications in the enterprise market, JRun's flexibility, performance, and footprint make it ideal for those in the ISV market looking to embed a Java application server.

JRun and ColdFusion 4.5 can also be used together today. The two products integrate through ColdFusion's native support for connectivity to Java Servlets and EJB. Together, ColdFusion and JRun provide an incredibly powerful application server infrastructure layer.

When ColdFusion and JRun are used together, ColdFusion provides the Web application logic layer through CFML, and JRun provides the business logic layer through EJB. ColdFusion is able to talk to JRun through native support for EJB connectivity.

For example, you could build an online store that uses ColdFusion to implement the Web interfaces and JRun to host the backend business logic. Typically, an online store needs to present a product catalog, provide a shopping cart, collect user and purchase information, send notifications and confirmations, etc. All of this Web functionality can be developed with ColdFusion. To support the purchase process, the online store will often need to interface with a number of existing systems that update inventory, financial,

and customer information across multiple databases. This purchase-processing business logic can be deployed as transacted EJBs using JRun. The two parts of the store will easily work together through the native interfaces to EJB in ColdFusion.

Application Server Roadmap

The next generation of the Allaire application server technology, code-named Pharaoh, will combine ColdFusion and JRun into a single application server. Pharaoh will offer a wide range of benefits:

- Language model that takes advantage of the benefits offered by CFML, JSP, Servlets, and EJB.
- Up-to-date implementations of the services and APIs specified in the J2EE the platform.
- Full support for CFML, and new CFML features and functionality that leverage the Java infrastructure for CFML processing (see Pharaoh programming model side-bar).
- Complete backward compatibility with ColdFusion 4.x applications and JRun 3.x applications.
- Completely cross-platform, Java-based architecture. (The runtime services in ColdFusion currently written in C++ will be moved to Java.)
- Support for all existing core and integration services in both JRun 3.0 and ColdFusion 4.5, as well as a host of enhancements and powerful new services.

The Pharaoh architecture will benefit every customer using Allaire application servers today. ColdFusion developers will be able to use a multitier architecture (Web application logic and business logic) in a single server. In addition, by running on top of Java, Pharaoh will provide support for placing CFML pages in transactions, enabling you to build more robust and reliable applications with CFML.

In Pharaoh, JRun customers will have access to a fully compliant next generation J2EE application server with complete Java programming capabilities. In addition, for Web application logic, Java developers will be able to optionally take advantage of the dramatic productivity of the CFML programming environment on the Java architecture. ISV customers, who OEM Allaire application server technology, will continue to be able to buy small-footprint, high-performance Pharaoh components that fit their specific business requirements for JSP/Servlets, EJB, or other elements of the server.

Today, you can take advantage of the power of CFML and Java, by using ColdFusion with JRun. Moreover, the work that you do today will easily upgrade to Pharaoh. As a single, Java-based application server with full support for CFML and wide variety of new features, Pharaoh will continue Allaire's leadership in the application server market.

Pharaoh Programming Model

Pharaoh will expose the powerful services and functionality of the application server through a two-layer programming model that supports both Web application logic and business logic in a single server.

For Web application logic, Pharaoh will provide three layers of abstraction: Java Servlets, JSP, and CFML. CFML will offer the highest level of abstraction and the greatest productivity, however it will not be required for Java developers who want to use JSP or Servlets. For business logic, Pharaoh will provide a robust environment for EJB with full support for distributed transactions and messaging. In addition, applications will be able to integrate with COM or CORBA. Any applications already written for ColdFusion 4.x or JRun 3.x will be 100% compatible with the Pharaoh server.

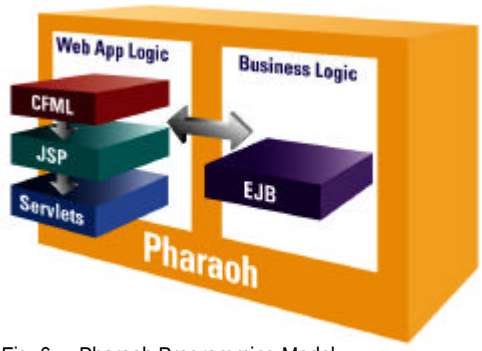

Fig. 6 – Pharaoh Programming Model

CFML processing in Pharaoh can be better understood through a comparison with ColdFusion 4.x. In ColdFusion 4.x, CFML pages are automatically compiled into p-code at runtime and processed by a server based on C++. In Pharaoh, CFML pages will be compiled directly to Java byte code and processed by a server based on Java, so CFML developers will not need to know Java to use Pharaoh. Options will be provided for just-in-time compilation at runtime or for pre-compilation at deployment, so you will be able to redistribute Pharaoh applications as compiled code.

The Pharaoh programming model will offer the productivity and flexibility of CFML, the performance and scalability of compiled Java, and the power of a distributed architecture built on industry standards.

Packaged Applications

The second pillar of the Allaire Business Platform is Allaire Spectra. Released in 1999, Allaire Spectra is a packaged application for content management, customer relationship management, and online commerce. Allaire Spectra builds on the power and flexibility of the rest of the Allaire Business Platform with the productivity of customizable applications. With Allaire Spectra you can quickly and easily deliver a wide range of Internet business solutions for content publishing, knowledge management, online commerce, customer self-service, and other business applications for the Internet Economy.

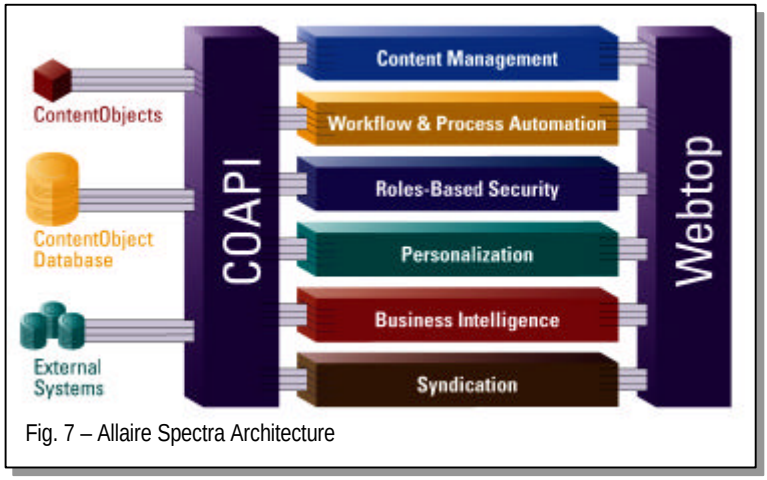

Fig. 7 – Allaire Spectra Architecture

The heart of Allaire Spectra 1.0 is a programming model called the Content Object API (COAPI). The COAPI uses objects to manage the content at the center of e-business applications. It abstracts the problems associated with creating, storing, and manipulating content within an application. On top of this core programming infrastructure, Allaire Spectra provides six key services:

- **Content Management** – Services for building information portals, managing content on Web sites, and creating content-centric applications.
- **Workflow and Process Automation** – Services for building custom workflow and process automation solutions that map to real-world business processes.
- **Roles-Based Security** – Services for managing users and groups, unifying authentication, and controlling access across your e-business solutions.
- **Personalization Services** – Services for user profiling, rules-based dynamic targeting, and the integration of third-party personalization engines.
- **Business Intelligence** – Services for logging, measuring, and reporting user activities in your Web business, providing business managers with analytical and decision-support tools.
- **Syndication** – A set of services for extending your Web business to Internet partners or site affiliates by exposing content and interactive features through structured interfaces.

Access to the COAPI and the core services is provided in a rich programming environment that uses a tag-based API, which integrates with CFML. On an administrator and business user level, Allaire Spectra includes a complete suite of visual tools in an integrated browser-based environment called the Webtop. The Allaire Spectra Webtop is described in more detail in the section on visual tools.

Allaire Spectra Roadmap

The next major release of Allaire Spectra will enhance the core services first introduced in Allaire Spectra 1.0 and will add a wide range of new advanced services for solving specific business problems. The enhancements to the core services will include the following:

- **EJB-Based Content Object API (COAPI)** – The underlying architecture of the COAPI will use Enterprise JavaBeans. Moving to EJB will not change the tag-based interface to the COAPI, but it will increase performance and flexibility. It will also expose the COAPI through a new Java-based API that allows developers to extend and implement Allaire Spectra systems using Java.

- **Enhancements to Core Services** – Each of the six core services in Allaire Spectra will be enhanced with new features and functionality that range from new editing tools in the content management services to greater control over process logic paths.

- **New Productivity Tools** – The next generation of the Allaire Spectra Webtop will include powerful new business productivity tools to manage online commerce assets, create and deploy product promotions, handle inbound customer service requests, and analyze customer buying and browsing behaviors.

- **New Development Tools** – The next release will include new wizards, visual tools for developing content objects, expanded inline coding support, and a wide variety of other new features for application development.

In addition to these and other enhancements to the core Allaire Spectra services, the next release will include new advanced services for managing customer interactions and merchandizing. Below is a description of some of those new services.

Advanced Customer Intelligence and Personalization Services

Building on the core Allaire Spectra services, the advanced customer services will solve key business problems associated with tracking and analyzing Internet customers and dynamically personalizing relationships:

- **Customer Profiling and Analysis** – To understand your customers in the Internet Economy, you need to build rich profiles of their interactions with your company. The new release of Allaire Spectra will provide a common XML-based repository for customer profiling based on customer interactions with your Web site and data from your enterprise systems. With a set of advanced analytical tools, you will be able to mine this data to learn more about your customers and find ways to make your Internet business more successful.

- **Advanced Personalization** – The next release of Allaire Spectra will include a powerful recommendation engine that will automatically analyze customer profile information, learn about customer interests, and generate intelligent recommendations so you can conduct one-to-one marketing and personalize your customer's sales and service experience online.

Advanced Merchandizing Services

Integrated with the customer interaction services, the next major release of Allaire Spectra will include new advanced merchandising services for creating commerce solutions targeted at opportunities in the Internet Economy.

- **Advanced Merchandise Management –** In most businesses, the information about merchandise, inventory, and pricing is distributed in a variety of legacy systems. The next release of Allaire Spectra will provide a centralized facility for compiling this information and managing it in the context of your online business offerings. Merchandise management services will make controlling everything from your price list to your online catalog straightforward.

- **Dynamic Pricing –** One of the most exciting innovations in the Internet Economy is broad adoption of dynamic pricing models, such as auctions and online bidding systems. The new pricing services will include a dynamic pricing engine, prepackaged solutions for auctions, and customized customer quote generation. These solutions will open the door to new revenue streams and give you tools to effectively compete on price—under the new rules of the Internet Economy.

- **Order Processing Management –** No matter what you're selling, common order processing requirements, such as payment processing, tax and shipment cost calculation, international currency conversion, and shipment and inventory notification, can be standardized. Allaire Spectra will support a range of components that use distributed transactions to guarantee successful order processing.

- **Purchase Assistance –** A variety of popular approaches for assisting customers making purchasing decisions have been introduced by leading e-commerce vendors, including customer reviews, customer ratings, wish lists, shopping lists, and one-click ordering. The purchase assistance services will let you implement these features in your online commerce systems.

Allaire Spectra enables an unparalleled range of solutions and a high degree of flexibility. The new release will continue the innovation and implementation of industry-best practices that characterize Allaire Spectra 1.0, so your investment today will continue to grow with your expanding e-business.

Visual Tools

The third pillar of the Allaire Business Platform is a line a powerful visual tools. These tools are designed to meet the needs of the full spectrum of participants with technology targeting developers, server administrators, and business users. All of Allaire's visual tools work together—maximizing the productivity of your entire team.

Integrated Development Environments

For developers, Allaire provides a line of IDEs specifically suited to the needs of e-business application development, targeted at specific classes of developers:

- **HomeSite®** – The premier environment for professional HTML designers, HomeSite offers an extensible suite of visual tools for creating the full range of browser-based interfaces, including HTML, Dynamic HTML, Wireless Markup Language (WML), XML, JavaScript, and other languages.

- **ColdFusion Studio** – ColdFusion Studio builds on the foundation created by HomeSite with advanced tools for creating Web applications, including database tools, interactive debugging, and support for remote development.

- **JRun Studio** – Designed specifically for the JSP developer, JRun Studio works with JRun and Java IDEs to provide a flexible environment for developing Web applications with J2EE technologies.

Using a common set of visual tools, Allaire's IDEs can make you and your team more productive.

Administration Tools

Managing applications with the Allaire Business Platform is straightforward with a variety of browser-based administrative tools. The ColdFusion Server Administrator gives your server management team the tools they need to control everything from security to text indexes. The JRun 3.0 Administrator includes tools for configuring your JSP applications and managing your EJB business objects. In the Allaire Spectra Webtop, your server administration team will find the technology they need to administer your business applications—controlling everything from the content caching to roles-based security.

Business User Tools

Because Web applications are customer facing, business users need to be empowered to control them. The Allaire Spectra Webtop provides a unique framework for business user application management. These include browser-based content authoring, workflow management, analysis of business results, and a variety of other common business functions.

With the application servers, packaged applications, and visual tools available in the Allaire Business Platform today, you can create solutions in every one of the major Internet business disciplines—from online commerce and customer relations to business automation and content management. These solutions will be able to leverage major technology advances as the Allaire platform develops.

Visual Tool Roadmap

New releases of Allaire visual tools at every level will increase the capabilities and productivity of your entire team across the spectrum of participants.

Integrated Development Environments

With the release of the Pharaoh application server, Allaire will deliver a new enterprise-class IDE for e-business application developers, code-named Pharaoh Studio. In addition to enhancements to existing features, Pharaoh Studio will add a new range of features focused on making developers more productive and improving the overall quality of applications:

- **Integrated Multi-Language Environment** – Pharaoh Studio let you work seamlessly with all of the languages (CFML, Java, XML, WML, JavaScript, etc.) associated with e-business application development in a single environment.
- **Symbol Awareness** – Pharaoh Studio will transform the way you work with dynamic page applications and automate the process of developing by keeping track of available variables, record sets, and other relevant information in a page and application.
- **Java IDE Capabilities** – Pharaoh Studio will include a suite of visual tools specifically designed for developers creating server-side Java applications.

- **Expanded Support for Allaire Spectra –** In Pharaoh Studio, you will find significantly more support for building Allaire Spectra applications.

In addition to Pharaoh Studio, Allaire will release a new version of HomeSite with a wide range of new features including major enhancements to visual design mode, support for new language standards, and new capabilities for managing and visualizing large-scale sites.

Administration Tools

With the Pharaoh release, the Allaire Business Platform will have a common console for administering servers, applications, and distributed components. The common console will provide an integrated framework for application server, management system, and packaged application administration. With the common console, you will be able to configure and manage your entire e-business from a single interface.

Business Productivity Tools

The next release of Allaire Spectra will include a significantly expanded array of tools for business users. The new Webtop will make it easier to empower business managers and business users with a variety of new features for managing customer interactions, site personalization, merchandise and inventory control, as well as enhancements to the productivity applications in the Allaire Spectra 1.0 Webtop.

SECTION IV: NEW INITIATIVES

In addition to the core services required for every e-business software infrastructure, companies moving aggressively onto the Internet will need to extend their platform to include new functionality that meets future Internet business requirements. The two most important next-generation capabilities are business-to-business (B2B) integration services and web systems management services:

- **B2B Integration** – Most B2B interactions will be conducted using Extensible Markup Language (XML) to describe data and HTTP as a transport protocol. However, taking full advantage of these technologies for B2B commerce will eventually require a set of advanced services, including XML processing and transformation, XML-based messaging, and application syndication.
- **Web Systems Management** – Internet business systems have a unique set of management requirements. With demands such as 24x7 uptime and globally distributed architectures, there is a critical set of management services that will need to be invented to support the next generation of e-business systems.

Allaire has major new technology initiatives in both of these areas that are explained below. With plans for new product releases, these initiatives will give you access to innovative new technologies that extend the capabilities of the Allaire Business Platform.

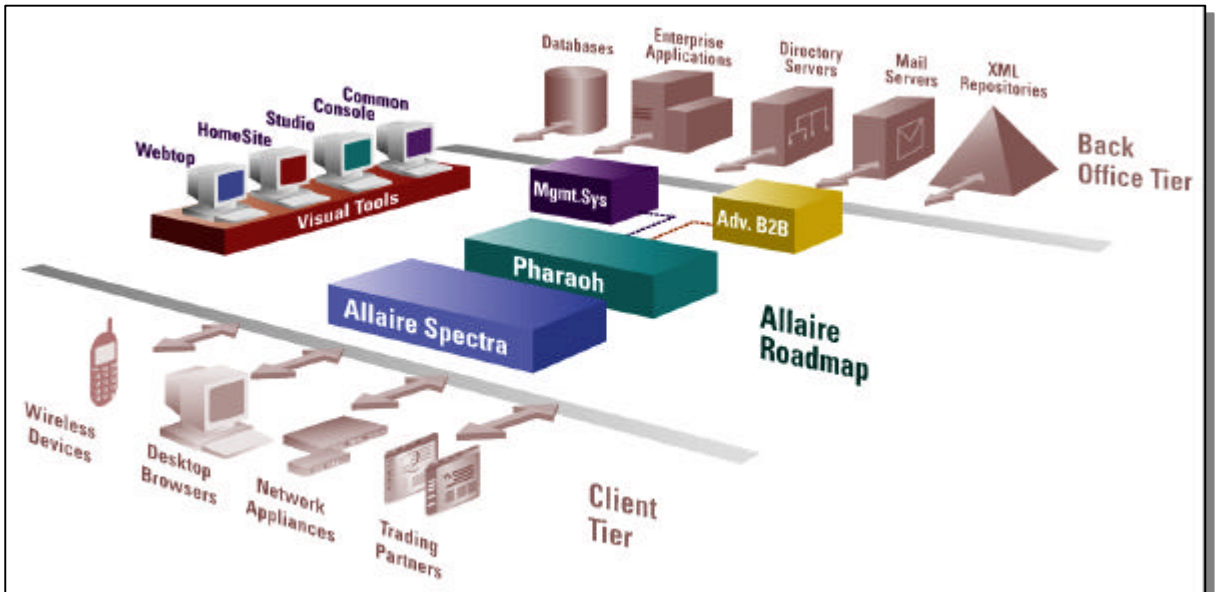

Fig. 8 – The Allaire Business Platform Roadmap

B2B Integration

From supply chain automation to channel management to new business models based on content syndication, Internet economy companies are finding ways to automate their businesses across the entire value chain. Delivering the systems to support these initiatives will require B2B integration services that

build on the foundation created by your application servers. These services make it possible to use the XML to more easily interact with your business customers and partners. To address these requirements, Allaire plans to release a new suite of B2B integration technologies, code-named Tron, that build on the Allaire application server infrastructure (see side bar for B2B services available today).

Tron represents the next horizon in Internet applications—systems that scale and execute across the boundaries of multiple companies. By automating the way businesses communicate with each other using a common set of open XML technologies, Tron will enable new business models based on syndication. Tron will include three major areas of functionality, which are described in detail below:

- Internet Message Queuing
- XML Transformation
- XML-Based Application Syndication

Internet Message Queuing

In the Internet Economy, businesses need to be able to automate interactions with each other across standard Internet protocols, such as HTTP and SMTP. The only way to handle this interaction reliably is with message oriented middleware (MOM) technology that guarantees every interaction is successful. MOM architectures use message queue servers to ensure that applications can reliably interact with each other, even when they are not available at the same time.

Fig. 9 – Internet Message Queuing

For example, imagine an online store that needs to place an order with a distributor over the Internet. Without a message queue server, the communication between the online store and the distributor's system needs to take place in real time, which is not always possible. Using a MOM architecture, the online store would send the order to the message queue server. The message queue server would contact the distributor's system, trying until successful, and then notify the online store system when the order was successfully placed. The entire process would be automatic, thus ensuring the integrity of the transaction and the security of the information.

To date, message queuing and MOM architectures have been entirely restricted to use in very high-end enterprise applications written in C++ or Java. These implementations were almost always built to service

needs within a corporation. Tron will expose message queuing services through easy-to-use tools that can be leveraged from the business logic layer or directly from the Web application layer of the application server. Tron will also integrate with installed message queuing technologies. Tron's MOM architecture will provide a foundation for reliable B2B commerce interactions.

XML Transformation

Whether an application is connecting to another company's business system, or integrating with an existing legacy system, the application will need to be able process the XML data streams sent by those programs. Typically described as "parsing," XML processing is the mechanism by which a system translates the XML data into a format that can be manipulated within the native environment of the system.

Building on the messaging infrastructure, Tron will provide a set of tools for XML transformation. These tools will include a variety of mechanisms for manipulating and transforming XML data streams. Every industry and consortium organized around major horizontal business problems, such as syndication, are competing to create new XML vocabularies that define standard XML syntax for various kinds of business data. It is unlikely that everyone will use the same vocabularies, and in the global economy, companies in different vertical industries will undoubtedly need to communicate with each other. The XML transformation tools will make it easy to integrate applications regardless of the XML vocabulary they are using.

XML-Based Application Syndication

XML-based application syndication gives business partners access to application functionality over HTTP using reliable and powerful XML-based APIs.

Application syndication is most easily understood through an example. Take a bank that has created a sophisticated mortgage calculator. The bank wants to give affiliated real estate agents the ability to use the mortgage calculator functionality on their site. On the Web today, the only mechanism would be for the real estate site to pass form requests to the bank site using server-side HTTP requests. With XML-based application syndication, the bank could expose a significantly richer set of functionality through an XML-based API over HTTP, while maintaining security and control over the system.

Tron will provide a mechanism for businesses to expose APIs via the Internet using XML. Tron's XML-based application syndication services will allow businesses to syndicate application functionality easily. The benefit will be access to new revenue streams and more efficient integration with business partners. These services will support emerging standards for Web-based application integration. The XML-based application syndication services will let you leverage your existing enterprise applications in the Internet Economy.

B2B Integration with the Allaire Platform Today

Although the Allaire Business Platform does not include a separate B2B integration product today, there are a number of powerful XML-based services built into the existing products. XML generation, parsing, and data exchange are well supported in ColdFusion 4.5 and JRun 3.0. Because of its tag-based syntax, the CFML programming environment is ideal for generating XML data streams. Both ColdFusion 4.5 and JRun 3.0 include a Java-based XML parser for processing XML data streams. XML editing is also fully supported in Allaire's visual tools.

In addition to providing standard support for XML, all of Allaire's products support Web Distributed Data Exchange (WDDX). One of the first applications of XML has been to simplify the exchange of structured data between programming environments. In 1998, Allaire introduced WDDX as an open standard that provides a general-purpose model for moving data between servers and/or programming environments.

WDDX has been implemented in Java, ColdFusion, Perl, PHP, Python, and ASP/COM. It offers a powerful, easy-to-use mechanism for taking a data structure, such as a two-dimensional array, in one environment and moving it to another. For example, imagine a Web site for a travel agency that wants to show end users weather data for popular travel destinations. A weather site written in ASP could publish the weather data as WDDX, and the travel site, written in ColdFusion, could obtain the data over HTTP, and easily convert it to display on their site.

Allaire Spectra also provides a range of services for content and application syndication through XML. These services give you the ability to easily distribute information from your site to affiliate sites, and they provide a mechanism for trading partners to interface with your online applications through XML.

Web Systems Management

In an economy where "Site Not Available" means "Closed for Business," new demands are being placed on your management systems. Looking forward to the next generation of e-business applications, there is a need for a new suite of management services specifically dedicated to Web applications. To prepare for this future requirement, Allaire is planning to release a new product, code-named Harvest, that is tightly integrated with the Allaire Business Platform. Harvest will build on the powerful foundation created by the management services in the Allaire Business Platform today (see side bar).

Based on the technology developed through Allaire's 1999 acquisition of Bright Tiger, a leader in Web site management products, Harvest is designed specifically to handle the Web systems management requirements of large-scale e-business solutions.

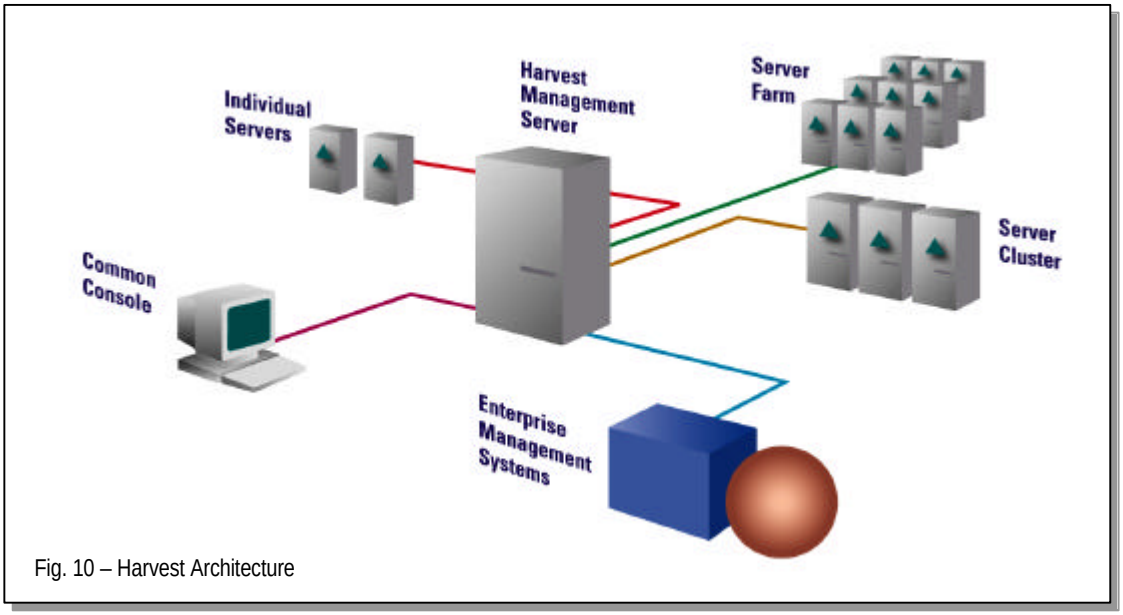

Fig. 10 – Harvest Architecture

Harvest will include services for managing the operations of scalable, high-performance Internet business systems. With Harvest, you will be able to easily manage large-scale e-business solutions with hundreds of servers in a single data center or distributed at remote locations worldwide. Harvest will include four major areas of functionality, which are described in detail below:

- Multi-Server Administration
- Deployment and Replication
- Real-Time Server Management
- Operational Reporting

Multi-Server Administration

In large-scale e-business systems it is not unusual to have multiple servers, and even multiple application server farms, in remote locations. Harvest will enable you to easily manage these from a single console. With the multi-server administration capabilities, administrators will be able to organize servers into logical groups, configure settings on server groups, administer security, manage components, and monitor performance and availability. Multi-server administration will radically simplify the challenges associated with deploying large-scale Web applications.

Deployment and Replication

Success in the Internet Economy demands that your business systems constantly evolve to address new needs and capture new opportunities. In enterprise-class environments, the constant change requires a robust suite of tools for managing the deployment of new applications.

Harvest will give you the ability to deploy applications and application changes quickly and reliably across large-scale server farms. With Harvest, you will have complete control over how new application functionality is deployed, along with the ability to synchronize new application deployments with server configuration.

Real-Time Management

In an Internet Economy, there is no concept of "acceptable down time." So once applications are deployed, Harvest will automate the process of monitoring and managing them in real time. Harvest will monitor load, performance, and availability metrics for your Internet business systems. The administrative console will provide an immediate visual representation of sites and applications. When problems are detected, Harvest will be able to trigger specific actions, such as alerts, server restrictions, recovery actions, or simple alterations in the operating environment to help optimize processing.

Operational Reporting

At the same time Harvest manages your systems in real time, it will record and track key operational statistics. With operational reporting available for your server groups, you will be able to evaluate how well each component of your e-business software infrastructure is functioning. The data will make it significantly easier to tune systems for performance, identify bottlenecks, and trouble shoot problems. The rich information provided by Harvest's operational reporting services will also simplify accurate capacity planning to prepare for future growth and business success.

Management Systems Integration

Harvest is designed to address the specific management requirements of your e-business software infrastructure. So you will be able to use it independently, or with installed enterprise management systems through standard interfaces.

Management in the Allaire Platform Today

The Allaire Business Platform is already at the cutting edge of Web systems management, and it provides a full suite of features and services that enable you to deploy and maintain high-volume, complex applications:

- **Clustering** – Both ColdFusion 4.5 and JRun 3.0 include native support for failover and HTTP request load balancing for building large-scale sites.
- **Local Director Integration** – Both ColdFusion 4.5 and JRun 3.0 can be integrated with Cisco Local Director for intelligent load balancing on very large-volume sites.
- **Component Administration** – JRun 3.0 gives you a full set of management services for administering distributed objects, including configuring deployment settings, deploying, monitoring runtime performance, and adjusting runtime settings.
- **Browser-Based Administration** – The JRun and ColdFusion servers both include browser-based administration, making remote administration straightforward.
- **Remote Development Services** – With the Allaire Business Platform, your development team can be distributed at multiple locations, and have the ability to access files and databases securely over HTTP with Allaire Remote Development Services (RDS).
- **Source Control Integration** – Both ColdFusion Studio and JRun Studio will integrate with your existing source control management system through the Source Code Control Interface (SCCI).
- **Scriptable Deployment** – Allaire visual tools support a very powerful deployment technology for scripting fine grain control over the deployment of applications on multiple servers.

SECTION V: DELIVERING SOLUTIONS

Success in the Internet Economy

Choosing the Allaire Business Platform will give you the e-business software infrastructure you need to realize the potential of the Internet Economy today and in the future. With the Allaire platform, you will be able to innovate and succeed in each of the major e-business disciplines: online commerce, customer relations, content management, and business automation. Building on the Allaire platform today will also give you the foundation to grow in the future. Most importantly, choosing the Allaire Business Platform will give you the ability to deliver solutions on your own terms—customized to meet the needs of your business.

The products and technologies that make up the Allaire Business Platform enable the creation of applications for each of the major e-business disciplines:

Online Commerce

With the robust foundation created by the ColdFusion and JRun application servers and the productivity and flexibility provided by Allaire Spectra, you can build everything from simple online stores to the most advanced B2B commerce systems. The combination of tight integration with HTML and XML, rich content management tools, support for personalization and robust backend transaction, as well as messaging technology, mean that you can both deliver innovative user experiences and ensure high availability and reliability.

Customer Relations

Fundamentally, customer service always involves information, interactions, and transactions with customers. The powerful content management technology, rich interfaces for messaging and communication, and strong support for distributed transactions in the Allaire platform make it ideal for delivering unique customer service solutions that let you differentiate yourself from the competition. And new services in the next release of Allaire Spectra will extend these capabilities.

Content Management

Whether you are delivering a corporate information portal, a new knowledge management solution for your sales force, or a dynamic publishing system for your Web site, the Allaire platform gives you everything you need to create a solution customized to your business requirements. Advanced features, such as integrated full text searching in the application server as well as personalization, flexible workflow, and content authoring tools in the packaged applications, let you address your content management needs.

Business Automation

As you look for opportunities to find new efficiencies and increase overall corporate productivity, the powerful technology in the Allaire Business Platform can address your business automation requirements. With the ability to create everything from basic process logic paths to fully distributed transactions, support next-generation clients, such as wireless phones, and proven reliability, the Allaire platform is a great foundation for building your business on the Web.

Conclusion

Companies that thrive in the new economy will embrace change. At the center of the change will sit a new set of business solutions built on an e-business software infrastructure. For the last five years, Allaire has pioneered the development of that software infrastructure. The Allaire Business Platform gives you a foundation to grow your business, capture new markets, overcome competition, and ultimately succeed in the new Internet Economy.

